

## Quality Assurance Project Plan (QAPP) for Hydraulic Fracturing (HF) Surface Spills Data Analysis

### A. Project Management

This section addresses project management, including project background and purpose, roles and responsibilities, and key research questions and objectives.

## A1. Title and Approval Sheet

QA Category: 1

Date Original QAPP submitted: August 2, 2012

Number of Pages: 9

Revision No: 0

Signatures indicate approval of this Quality Assurance Project Plan and commitment to follow the applicable procedures noted:

/s/

8/2/2012

Leigh DeHaven, Data Analyst and Project Lead

Date

/s/

8/2/2012

Susan Burden, HF Data Analysis Technical Research Lead

Date

/s/

8/3/2012

Jeanne Briskin, HF Study Plan Coordinator

Date

/s/

8/3/2012

Stephen Watkins, Quality Assurance Manager, Office of Science Policy

Date

/s/

8/6/2012

Mimi Dannel Deputy Director, Office of Science Policy

Date

## A2. Table of Contents

A. Project Management .....	1
A1. Title and Approval Sheet .....	1
A3. Distribution .....	3
A4. Project Organization .....	3
A5. Problem Definition and Background .....	4
A6. Project Description .....	4
A6.1. Data, Sources and Rationale for Data Selection .....	5
A7. Quality Objectives and Criteria .....	6
A7.1. Hydraulic Fracturing Spills Data Acceptance Criteria .....	6
A8. Special Training/Certification .....	7
A9. Documentation and Records .....	7
B. Data Generation and Acquisition .....	7
B5. Quality Control .....	7
B9. Non-Direct Measurements .....	7
B10. Data Management .....	8
C. Assessment and Oversight .....	8
C1. Assessments and Response Actions .....	8
D. Data Validation and Usability .....	9
D1-D2. Data Review, Verification, Validation, and Validation Methods .....	9
D3. Reconciliation with User Requirements .....	9
Revision History .....	9

### A3. Distribution

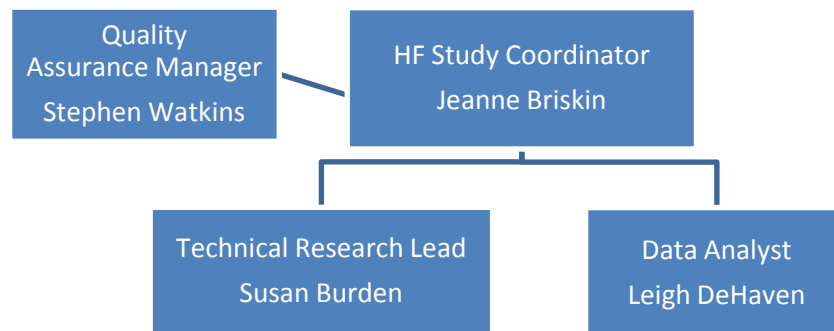
This QAPP will be distributed to the staff members of the U.S. EPA as listed in *Table 1*.

**Table 1: QAPP distribution list.**

Name Title	Contact Information
<b>Leigh DeHaven</b> Data Analyst and Project Lead	(202) 564-1974 dehaven.leigh@epa.gov
<b>Jeanne Briskin</b> Hydraulic Fracturing Study Plan Coordinator	(202) 564-4568 briskin.jeanne@epa.gov
<b>Susan Burden</b> Hydraulic Fracturing Data Analysis Technical Research Lead	(202) 564-6308 burden.susan@epa.gov
<b>Stephen Watkins</b> Quality Assurance Manager	(202) 564-3744 watkins.stephen@epa.gov

### A4. Project Organization

Project organization for the HF surface spills analysis is depicted below in *Figure 1*. Leigh DeHaven will be responsible for the secondary data collection, analysis, and presentation, and will thus be responsible for ensuring that the quality of work meets the requirements of EPA's *Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*. She will also keep the Program Quality Assurance Manager (PQAM), Steve Watkins, advised of any quality problems that arise in this study. The PQAM will be responsible for maintaining QA activities and the official, approved QAPP throughout the course of the project.



**Figure 1: HF surface spills data analysis organizational chart.**

## A5. Problem Definition and Background

In recent decades, HF has been increasingly used to access one of the nation's key energy resources, natural gas. In the process of hydraulic fracturing, natural gas or oil is extracted from so-called "unconventional" reservoirs via high-pressure injection of water, chemical additives, and proppants. In response to the growing use of HF in the United States, the U.S. Congress' Appropriation Conference Committee requested that EPA study the potential relationship between HF and drinking water. In response to this request, EPA produced a *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*.<sup>1</sup> In this plan, EPA identified surface spills of HF fluids and wastewater as a research area by defining the following fundamental research questions:

- What are the possible impacts of surface spills on or near well pads of HF fluids on drinking water resources?
- What are the possible impacts of surface spills on or near well pads of flowback and produced water<sup>2</sup> on drinking water resources?

In each of these cases—surface spills of HF fluids or surface spills of flowback and produced water—EPA identified the following secondary research question:

- What is currently known about the frequency, severity, and causes of spills of HF fluids and wastewaters?

The goal of this project is to answer this secondary research question.

## A6. Project/Task Description

Information from existing sources will be collected and reviewed in order to assess the frequency, severity, and causes of surface spills of HF fluids and wastewaters on or near the well pad site. Reported transportation related spills of HF fluids or wastewaters on public roads will not be considered in this analysis. Existing sources of information that may inform this effort include, but are not limited to:

- National Response Center database,
- State departments of environmental protection and quality
- State oil and gas agencies
- Information received by EPA from nine oil and gas operators and nine HF service companies

Types of databases from the sources listed above may include but are not limited to:

- Compliance Reporting Databases

---

<sup>1</sup> U.S. Environmental Protection Agency. *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*. EPA/600/R-11/122. Office of Research and Development, November 2011.

<sup>2</sup> For this analysis, "flowback" is the fluid that returns to the surface after the HF procedure is completed and the injection pressure is released. "Produced water" is defined as the fluid that is produced when the well is put into production. Together, these fluids are referred to as "HF wastewaters."

- Inspection/Incident Databases
- Spills Databases
- Enforcement Actions Databases

The initial phase of this project will focus on National Response Center spill notification data and publically available state databases. EPA will focus on states with heavy oil and gas development activity, including Texas, Colorado, Pennsylvania, New Mexico, and Wyoming. Additional state data may be added to the analysis using the criteria listed below depending on time and resources available. Any additional states would be selected based on high volumes of oil and gas activity related to hydraulic fracturing. The additional publicly available databases identified and evaluated in the spills data analysis would be disclosed with the study findings. Spills data from the nine oil and gas operators and nine HF service companies providing information to the EPA will also be reviewed. Some of the data provided by the nine oil and gas operators and nine services companies to EPA may be classified as confidential business information (CBI) under TSCA. All of the CBI data will be handled in accordance with EPA's TSCA CBI handbook.

The results of the spills data analysis will be examined together with other hydraulic fracturing sub-projects in the study, such as the well-file review, the analysis of HF fluid formulations, and related literature reviews to determine possible groundwater contamination scenarios resulting from surface spills.

#### **A6.1. Data, Sources and Rationale for Data Selection**

The initial phase of this project will focus on National Response Center spill notification data and publically available state databases. EPA will first focus on states with heavy oil and gas development activity, including Texas, Colorado, Pennsylvania, New Mexico, and Wyoming. Further state data may be added to the study from states with a significant oil and gas development related to hydraulic fracturing depending on the time and resources available. Spills data from the nine oil and gas operators and nine HF service companies who provided information to EPA will also be reviewed.

This project will address the following key issues:

- Define differences between spill notifications, spill violations, and complaints
- Identify spill databases that provide specific information about spills associated with HF fluids and wastewaters, focusing on:
  - Name and management source of the database
  - Location and accessibility of database (website)
  - Reporting timeframe
- Summarize specific spill incidents in a table that will include the following information:
  - Database name (source of information )
  - Generic incident number
  - Location of spill (county, state)
  - Chemical/product spilled

- Estimated/reported volume of spill
  - Cause of spill
  - Reported impact to nearby water resources, if applicable
- Compile summary statistics based on specific spill incidents, including:
  - Frequency of Spills
  - Chemicals and/or fluids spilled
  - Severity (based on spill volume)
  - Cause of the spill
  - Relationship to hydraulic fracturing

## **A7. Quality Objectives and Criteria**

EPA does not make any claims on the quality or accuracy of the data or information found in the data sources listed in Section A6. This QAPP aims to ensure that secondary data used for this evaluation are of sufficient quality necessary to achieve proper data analysis. This section addresses the quality criteria used to assess the adequacy of secondary data used in this project, as well as the uncertainty in the results derived from the use of these data sources.

All project results will include documentation of data sources and the assumptions and uncertainties inherent within that data, as well as computations and calculations made with secondary data. Data assessment and acceptance criteria for this project are outlined in Section A7.1.

To the extent possible, recorded information will be quantitative. Information that cannot be described quantitatively will be recorded in an organized format if the information is relevant to the study objectives. Individual queries will be developed for the spreadsheet or database to allow quantification of the results.

### **A7.1. Hydraulic Fracturing Spills Data Acceptance Criteria**

The data acceptance criteria that will be used to evaluate the HF spill data include timeliness, comparability, and completeness. The timeliness will depend upon if the data applies to spills from January 1, 2006 to April 30, 2012. Comparability between the databases will be evaluated to describe the extent to which the spill data values (spill frequency, substance spilled, spill volume, and cause of the spill) in different states and the National Response Center may be compared. Data on spills will be used to document the spill event covering the aspects of spill frequency, volume, and cause of the spill within the extent of the data that are shared within each spills database. An evaluation of how complete the data are from each of the spills data sources will be conducted by reviewing each of the spill data values listed above. Because each of the spills database formats are different, data collected from the databases may not include all of the data variables listed in section A6. Determining if the spill incident is associated with hydraulic fracturing will be based on the description of each incident in the spills databases. The data will be accepted if the information specifically states that the spill was associated with hydraulic fracturing, or uses keywords describing hydraulic fracturing processes, products or terminology. Search engine keyword examples may include hydraulic fracturing, “fracking,” or flowback.

## **A8. Special Training/Certification**

During the course of this project, Ms. DeHaven will access and analyze spill data claimed to be confidential business information (CBI) under TSCA. Throughout this project Ms. DeHaven will adhere to CBI procedures when handling confidential information and will manage all reports, documents, and other materials developed in accordance with the procedures set forth in EPA's TSCA CBI Protection Manual.<sup>3</sup> Ms. DeHaven will maintain active TSCA CBI clearance, and all work involving TSCA CBI will be completed on the approved TSCA CBI computer.

## **A9. Documentation and Records**

All project documents will be submitted to the HF Study Coordinator, Jeanne Briskin. The final report will include a detailed description of the methods used to produce the data tables, as well as any assumptions or uncertainties inherent in those methods.

The final report will contain an appendix listing the specific spills databases used and the locations of those data online. This appendix will also specify any modifications that were made to the original databases obtained. All errors and uncertainties associated with each data set will be documented and included in this section.

Confidential business information submitted in response to EPA's information requests will be reviewed and included in a CBI version of the final report. All CBI documents will be handled in accordance with EPA's TSCA CBI Protection Manual and will be kept separate from public data to protect CBI claims.

## **B. Data Generation and Acquisition**

This section addresses data acquisition and management activities, including the following elements identified by EPA:

- Element B5: Quality Control
- Element B9: Non-direct Measurements
- Element B10: Data Management

### **B5. Quality Control**

All data used in this project will meet the criteria listed in Section A7.1 and will be examined to ensure that they meet these criteria at each stage (data acquisition, manipulation, and analysis).

### **B9. Non-Direct Measurements**

As described in A.6, all data used in this project will be obtained from existing databases managed by the National Response Center and state data from Texas, Colorado, Pennsylvania, New Mexico, and Wyoming and spills data from the nine oil and gas operators and nine HF service companies who provided information to EPA. The intended uses of the spill information from the databases are listed in detail in Section A6.1.

---

<sup>3</sup> U.S. Environmental Protection Agency, *TSCA CBI Protection Manual*, EPA Office of Pollution Prevention and Toxics (7407 M), October 20, 2003.

## **B10. Data Management**

The data under this task will be maintained in Excel, Word and Access files to allow for ease of analysis in those programs. Some of the data used for this project will be TSCA CBI. All such data and products utilizing this data will be managed following the procedures set forth in EPA's TSCA CBI Protection Manual. The project lead, Ms. DeHaven, will maintain active TSCA CBI clearance and will use a TSCA-compliant computer whenever working with TSCA CBI data.

## **C. Assessment and Oversight**

This section describes the audits and other assessments needed to determine whether this QAPP is being implemented as approved and to increase confidence in the information obtained and produced as a result of this project.

### **C1. Assessments and Response Actions**

All work conducted for the HF surface spills data analysis project will be subject to technical review by the HF Study Coordinator, Jeanne Briskin, and the HF Data Analysis Technical Research Lead, Susan Burden. Steve Watkins will serve at the Program QA Manager for this project and will review this QAPP for completeness and applicability. He will be available to assist Ms. DeHaven with QA issues as they arise and will periodically review compliance with this QAPP. This project will also undergo periodic data quality audits and technical systems audits, as described below.

#### **C1.1. Data Quality Audit**

The spills data used in this study will be collected from existing data sources. EPA does not make any claims on the quality or accuracy of the existing data gathered and used in the spills analysis. Each of the databases has its own existing data quality. However, the products developed with these data will be reviewed by the Data Analysis Technical Research Lead and the Quality Assurance Manager to ensure that they accurately reflect the collected data. EPA will conduct spot checks to understand the natural variability in the databases consulted in this study.

#### **C1.2. Technical Systems Audit**

A technical systems audit will occur toward the beginning of the spills data analysis to ensure that the appropriate methods are used in the analysis as outlined in this QAPP, and that the data are being handled in a manner consistent with TSCA CBI requirements. Necessary deviations from procedures outlined in this QAPP will be addressed through revisions to the QAPP.

### **C2. Reports to Management**

Ms. DeHaven will supply a draft report on the products and findings of this analysis to the HF Study Coordinator, the HF Data Analysis Technical Research Lead, and the QA manager for comment and will incorporate their comments into the final report. Ms. DeHaven will keep the study team involved through weekly technical progress updates in which any problems encountered will be described and feedback will be solicited as necessary to ensure the quality of the finished product.



## **D. Data Validation and Usability**

This section addresses the quality of the completed final report to see if this product will conform to the objectives outlined in this QAPP, especially given this project's use of existing data sets.

### **D1-D2. Data Review, Verification, Validation, and Validation Methods**

All data will be reviewed for timeliness, completeness and comparability. Uncertainties of existing data sets will be examined to ensure that all data adhere to the criteria outlined in this QAPP. All final products will be examined to ensure that data are correctly displayed in tables and figures. In addition, data will be reviewed and examined to determine if there are data entry errors as data are collected from existing sources.

### **D3. Reconciliation with User Requirements**

The checks that will be used to determine the timeliness, completeness and comparability of all existing data and final products are described in Section C. These measures will be reported in all project deliverables, which will allow the HF study team and future data users to determine if the data are of sufficient quality for other uses.

Ms. DeHaven will work with the study team and the QA staff to determine to what extent the data that do not meet the specified data acceptance criteria may be used to support further study and how this determination will be documented. In addition to an evaluation of data quality, Ms. DeHaven will identify data sources, assumptions made and changes or modifications to data used in their development in the draft and final reports.

## **Revision History**

<b>Revision Number</b>	<b>Date Approved</b>	<b>Revision</b>
0		New Document